

(10)



Europäisches Patentamt  
European Patent Office  
Office européen des brevets

(11) Publication number:

**0 039 203  
B1**

(12)

## EUROPEAN PATENT SPECIFICATION

(45) Date of publication of patent specification: **04.12.85**

(51) Int. Cl.<sup>4</sup>: **G 08 B 25/00**

(21) Application number: **81301787.8**

(22) Date of filing: **23.04.81**

(54) **Sheltered housing schemes communications system.**

(24) Priority: **26.04.80 GB 8013849**

(42) Date of publication of application:  
**04.11.81 Bulletin 81/44**

(45) Publication of the grant of the patent:  
**04.12.85 Bulletin 85/49**

(64) Designated Contracting States:  
**AT BE CH DE FR GB IT LI LU NL SE**

(56) References cited:  
**GB-A-1 494 893  
US-A-3 914 692**

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Courier Press, Leamington Spa, England.

**EP 0 039 203 B1**

## Description

This invention relates to a communications system for sheltered housing schemes.

Sheltered housing schemes usually consist of a localised group of individual tenanted houses interlinked by an emergency communications system with a local warden's house. The warden's house contains a control panel which is hard-wired to outstations in each tenanted house. Each outstation comprises at least one manually-operable switch all connected in parallel, a speaker/microphone and a habit monitor. The warden's control panel comprises, for each tenanted house, an LED and an ON/OFF switch, and selectable between the tenanted houses a speaker/microphone arrangement, a 'speak' switch and a 'call' switch. The operation of the system is such that when a tenant operates his manually-operable switch the corresponding LED on the warden's control panel takes up a flashing status and the tone generator causes an audible alarm signal to be emitted by the control panel speaker which alerts the warden to actuate the appropriate ON/OFF switch and the 'call' switch thereby opening two-way speech communication between the particular tenant and the warden. The habit monitor in each tenanted house is usually a pressure pad mat actuating ON/OFF switch and at selected times during the day the warden actuates a habit monitor selector switch to connect each habit monitor to the pertaining LED. If the habit monitor switch is at OFF the LED is illuminated but on passage of the tenant over the pressure pad the switch changes to ON and the LED is latched in its extinguished condition.

Such sheltered housing communications systems are manufactured by Davis Safety Controls Ltd. and by Tunstall Byers Ltd. and currently are in daily use.

The known sheltered-housing-communications systems suffer from the disadvantage that to operate effectively when an emergency arises in a tenanted house the warden's house requires to be occupied at all times or at least the warden requires to be in the immediate vicinity of his house at all times in order to respond to an alarm call. This therefore inhibits a warden from leaving his house for personal reasons (such as purchase of provisions) and for reasons of care of the sick and needy in the sheltered housing scheme. Furthermore because the warden's house is also a dwelling house it is not practical for a relief warden to be installed during periods of lengthy absence such as may arise due to holidays. There is therefore a need for a centralised sheltered-housing communications centre at which the functions of the local warden can be undertaken on a 24-hours per day back-up basis for each of a plurality of sheltered housing schemes.

An emergency communications system is described in U.S. Patent No. 3914692 comprising portable units for being carried by wearers each including a radio transmitter/receiver coupled to handle coded radio signals to and from a console.

The console is arranged, on receipt of a coded radio signal from a particular portable unit, to transmit an emergency signal via a land line to a remote central station which consequentially implements a call for assistance and generates an acknowledge signal for the console. The console then generates a coded acknowledge signal to the particular portable unit where a vibratory device is activated to notify the wearer that assistance is being provided.

According to the present invention there is provided a communications system comprising a terminal interconnected by a communications network with a plurality of outstations and via communication channels with a remote communications centre, characterised in that the system is a sheltered housing communications system for speech and habit monitoring signals and comprises a plurality of sheltered housing groups each of which has a plurality of tenanted houses and a local warden's house, said local warden's house accommodating a said terminal and said outstations being accommodated in respective ones of the tenanted houses, wherein each outstation and terminal comprises an operator actuated speaker/microphone arrangement and a habit monitoring arrangement whereby for each group the tenanted houses are individually in two-way speech and habit monitoring signal communication with the warden's house and said remote communications centre functionally duplicates the terminal at each said warden's house, each said warden's house comprising means for switching the pertaining network through to the communications centre via the pertaining communications channel so as to bypass the local warden's terminal, and each communications channel incorporating MODEMs and encoding means and being arranged to operate in multiplex/duplex to maintain two-way speech quality between the centre and the outstations.

An embodiment of the present invention will now be described by way of example with reference to the accompanying drawings, in which:

Fig. 1 schematically illustrates the system;

Fig. 2 illustrates a warden's terminal;

Fig. 3 illustrates part of an outstation;

Fig. 4 illustrates the system in greater detail; and

Fig. 5 illustrates the layout of the communications control centre.

In the drawings, Fig. 1 illustrates a sheltered housing communications system according to the present invention comprising a communications centre 10 linked by Post Office land lines 11 to a terminal in each of a plurality of local wardens houses 12. Each warden's house 12 is at the centre of a conventional communications network 13 interconnecting outstations located in tenanted houses 14.

Each warden's terminal network 13 and associated outstations is conventional and may be of the kind described above and manufactured

by Davis Safety Controls Ltd. or Tunstall Byers Ltd. Thus within each wardens house 12 there is a terminal which permits two-way communication between any one of houses 14 and house 12. Wardens house 12A, with associated tenanted houses 14A, is linked to the adjoining wardens house 12 for communication with centre 10 via network 13A.

Fig. 2 illustrates the known terminal 20 for each wardens house 12 and comprises for each tenanted house 14 served by wardens house 12, an LED 21 with an associated ON/OFF switch 22 operation of which permits communication between the pertaining house 14 and the terminal 20 by means of an audio link comprising microphone/speaker 23, a volume-double switch 24 and a push to speak switch 25, the latter when operated enabling the wardens speech to be received by the tenant. Fig. 3 illustrates part of the outstation 30 in each tenanted house 14 and comprises a speaker/microphone 31 and a three-position switch 32 operable directly by hand and by an emergency pull cord 33. Switch 32 may either be in its OFF, STANDBY, or CALL position and when moved by pull cord 33 to the CALL position causes the corresponding LED 21 in the wardens terminal 20 to take on a flashing status and simultaneously activates an audible alarm in or near the wardens house 12 and mutable by means of a switch 26 on terminal 20. Outstation 30 also comprises a habit monitoring mat (not shown) which functions as a single ON/OFF switch at the tenanted house 14 but which is enabled by switch 27 of terminal 20 which causes LEDs 21 to be constantly illuminated until the habit monitoring mat switch is operated. Terminal 20 also incorporates a call switch 28 which activates the speaker/microphone 31 of outstation 30 in conjunction with the pertaining switch 22 so that the warden may initiate audible communication with each tenanted house 14.

The centre 10 duplicates the function of terminals 20 at each of the local wardens houses 12 as described above. For this purpose each house 12 additionally incorporates a data encoder 35 the output of which is connected to a MODEM 40 for connecting the appropriate network 13 through to the centre 10 functionally bypassing the terminal 20 at the house 12. The MODEM 40 is connected to Post Office land line 11 and centre 10 incorporates a corresponding MODEM 40A terminating line 11 and having a line driver 41 connected within centre 10 to drive an electronic mimic diagram 42 and a central processor (CPU) 43 with an associated memory system 44. CPU 43 has connections to an audio system 45, a colour video system 46, a keyboard system 47 and a printer 48.

The CPU 43 operates in real time and programming is by paper tape, card, magnetic tape or disc. Memory system 44 stores record files of tenanted houses 14 and occupants together with appropriate personal information. The main programme for the CPU 43 is adapted to log the time of an incoming call, and designate a tele-

metric source address and time of replay by the operator at centre 10.

The land lines 11 form part of a communications channel between centre 10 and each of the houses 12 over which the transmission is multiplex duplex with speech quality maintained up to 2400 Hz cut-off at a data transmission rate of about 300 bits/second.

It will be noted that terminal 20 of Fig. 4 is connected to the output of encoder 35 and accordingly operates as a data processor but its function is as previously described with reference to the terminal 20 of Fig. 2. Thus instead of LEDs 21 and manual switches 22, 24—28, the Fig. 4 terminal 20 comprises a visual display unit and associated keyboard. If so desired however the Fig. 2 terminal 20 can be retained but connected in parallel with encoder 35 to network 13.

A typical layout for centre 10 is illustrated in Fig. 5 and comprises a console 50 with video display unit 51 forming part of video system 46, a keyboard 52 forming part of system 47 and an operator's chair 53. Within the view of an operator at chair 53 there is also the detailed mimic diagram 42 illustrating the various housing schemes operated by centre 10 together with detailed roadways thereof, and to permit contact with mobile wardens 15 (see Fig. 1) console 50 has a telephone 55 with rapid autodialler 56. As an alternative means of communication with mobile wardens 15 console 50 also has a radio 57 with microphone/speaker 58. Console 50 also includes an acoustically-switched speaker/microphone 59 forming part of audio system 45 for communicating with a tenanted house 14.

A duplicate console 50A equipped with video display unit, keyboard and acoustically-switched speaker/microphone is provided as a backup for console 50 at centre 10.

The system typically operates as follows:

An emergency call initiated by a tenant at an outstation 30 is encoded by encoder 35 and delivered either to the wardens terminal 20 or to centre 10 as a data signal. Assuming that the wardens terminal 20 is functionally bypassed as will be explained the signal is registered on a first portion of the VDU 51 and gives momentary audible indication on a tone generator (not shown) at centre 10. Typically this VDU statement flashes or is of double brightness or is colour shifted until the operator presses a key on the keyboard 52 to accept the call. The display then resets to standard quiescent display. The printer 48 records the time and information presented on the VDU 51 and the fact that the call has been accepted, all under the control of CPU 43.

The operator enters, via the keyboard 52, the corresponding telegraphic address (which under control of CPU 43 is also displayed on a second portion of the VDU) and immediate speech connection with the pertaining tenant is established by way of speaker/microphone 59.

A speech recording system 60 functions only when speech is being transmitted and records all

speech on the system. The two-way conversation is conducted by the tenant and by the operator. Should the operator have difficulty in making him/herself heard by the tenant then by pressing select keys on the keyboard 52 the system simulates the function of volume doubling switch 24 in the local wardens terminal 20 and doubles the speech volume output to the tenant. When the conversation is complete a keycode input to keyboard 52 clears down the call.

Should the tenant not be able to reset the outstation 30 in his/her house by actuating the switch 32 (so that it is in its central position) then a constant reminder of this situation is maintained on the VDU 51 (e.g. by colour coding).

By selecting the telegraphic code and the appropriate keys on the keyboard 51 the operator has the facility at any time to energise the tone generator and speaker/microphone 31 which sounds in a particular tenant's house 14. Initiation of the speechlink to establish communication is thereafter carried out in the normal manner by pulling of the pull cord 33 in the tenant's house so that switch 32 is in its CALL position.

All calls are recorded by code and by time on the hard paper printer 48 of centre 10.

If during the above process a further call is received by the CPU 43 then each such further call is logged in time order on the VDU 51 so that no call will be lost; the VDU 51 has an appropriate page system to stack all such calls and indicate an overspill to a next page file whilst constantly updating the queue once calls have been cleared, i.e. automatic restack. All incoming calls are also immediately recorded on the paper printer 48.

The operator indicates on the stack queue, by means of a cursor on the screen of VDU 51, the call to be selected next for answering or can simply key in the telegraphic address desired and allow the CPU 43 to delete that entry from the queue and automatically restack.

Typically, telegraphic addresses have meaningful derivations of the street address:—

a) Scheme identification

Craigmillar Castle Gardens	—Code CCG
Lady Nairne Crescent 1	—Code LNC1
Lady Nairne Crescent 2	—Code LNC2

allowing 5 alphanumeric characters per code.

The street number follows the Scheme Code

b) House number identification

CCG —101
LNC1— 50A/1
LNC2—101C/2

allowing 6 alphanumeric characters per code.

c) The tenants name and full address follows the telegraphic address

CCG—101	Mr. & Mrs. A. B. Callaghan
	101 Craigmillar Castle Gardens
LNC1—50A/1	Mrs. Thatcher
	50A/1 Lady Nairne Crescent
LNC2—101C/2	Mr. & Mrs. Benn
	101C/2 Lady Nairne Crescent

The full statement shown above is listed on the VDU 51 to indicate an incoming call. The operator uses the corresponding code e.g. CCG101 entered through keyboard 52 to establish the speech link.

Whilst the operator is handling a call he/she can call up from memory system 44 a file to be displayed on another portion of the VDU 51 screen. The file holds up to 5 lines of data pertaining to the tenant e.g. next of kin, doctor's name, etc. This listing may be called by pressing a master key L followed, typically by keys CCG101, on keyboard 52.

The processor 43 when on remote i.e. central control, constantly updates the habitation monitoring information. The operator presses H followed typically by CCG on keyboard 52, to simulate the habitation initiation push-button 27 on the wardens terminal 20, and on the VDU 51 a matrix of telegraph addresses or house numbers with a common scheme address statement (i.e. CCG) in a particular colour or brightness is presented to initiate a time habit monitoring event. A time mark also appears on the screen of VDU 51 and the CPU 43 enables hard paper print out on printer 48 frozen at the time mark.

After a period of typically a few minutes or perhaps an hour or so, the matrix on VDU 51 may be recalled should any of the habitation mats have been depressed resulting in the telegraph address or house number changing colour or brightness on VDU 51, this event being time logged below that particular telegraph address. Again there is a paper print-out on printer 48 with a time mark.

The habitation monitoring on the wardens terminal 20 does not have a close down facility hence to simulate this the state of the matrix on VDU 51 is allowed to decay until initiation again by the operator.

It is important to note that whilst the wardens terminal 20 is bypassed, local interference with the switches on the wardens terminal 20 has no effect on the remote monitoring. This is achieved in the case of the Fig. 2 terminal by provision of a switch 29 and in the case of the Fig. 4 terminal by a keyboard entry which disconnects terminal 20 from the system thereby leaving tenanted houses 14 directly connected to centre 10. This disconnection function can also be initiated by a keyboard entry at centre 10. Also, to perform this function wardens terminal 20 can be put into communication, including audio, with centre 10. When wardens terminal 20 is in the Fig. 4 form a local memory system connected to encoder 35 holds personal details of the tenants of locally

connected houses 14, as a duplicate of the corresponding information in memory system 44 at centre 10 and an automatic stacking system is provided to queue incoming calls to the wardens terminal 20 for a fixed time interval such as 15 minutes before an auto-referral programme is initiated which automatically directs the queued calls directly to centre 10 bypassing local wardens terminal 20.

#### Claim

A communications system comprising a terminal (20) interconnected by a communication network (13) with a plurality of outstations (30) and via communication channels (11) incorporating MODEMS (40, 40a) and encoding means (35) and being arranged to operate in multiplex mode with a remote communications centre (10), characterised in that the system is a sheltered housing communications system for speech and habit monitoring signals and comprises a plurality of sheltered housing groups (12, 14) each of which has a plurality of tenanted houses (14) and a local warden's house (12), said local warden's house (12) accommodating a said terminal (20) and said outstations (30) being accommodated in respective ones of the tenanted houses (14), wherein each outstation (30) and terminal (20) comprises an operator actuated speaker/microphone arrangement (31, 32, 33) and a habit monitoring arrangement (27) whereby for each group the tenanted houses (14) are individually in two-way speech and habit monitoring signal communication with the warden's house (12) and said remote communications centre (10) functionally duplicates the terminal (20) at each said warden's house (12), each said warden's house (12) comprising means (29) for switching the pertaining network (13) through to the communications centre (10) via the pertaining communications channel (11) so as to bypass the local warden's terminal (20).

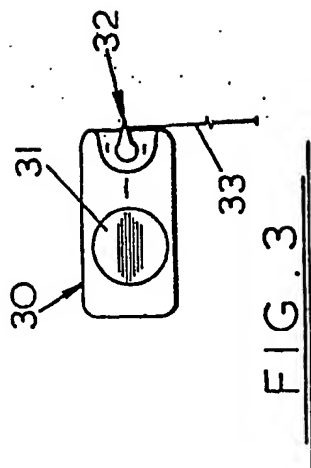
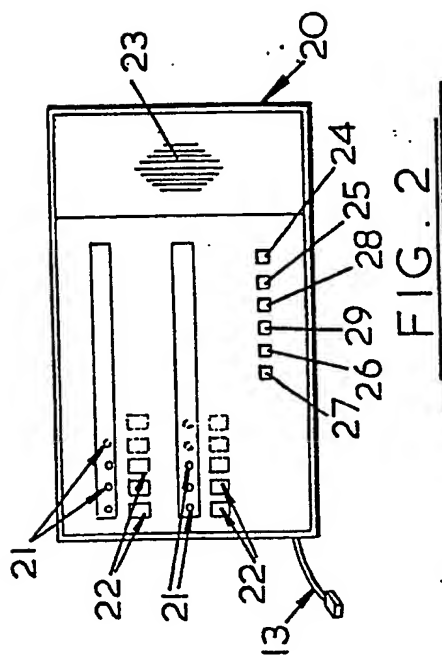
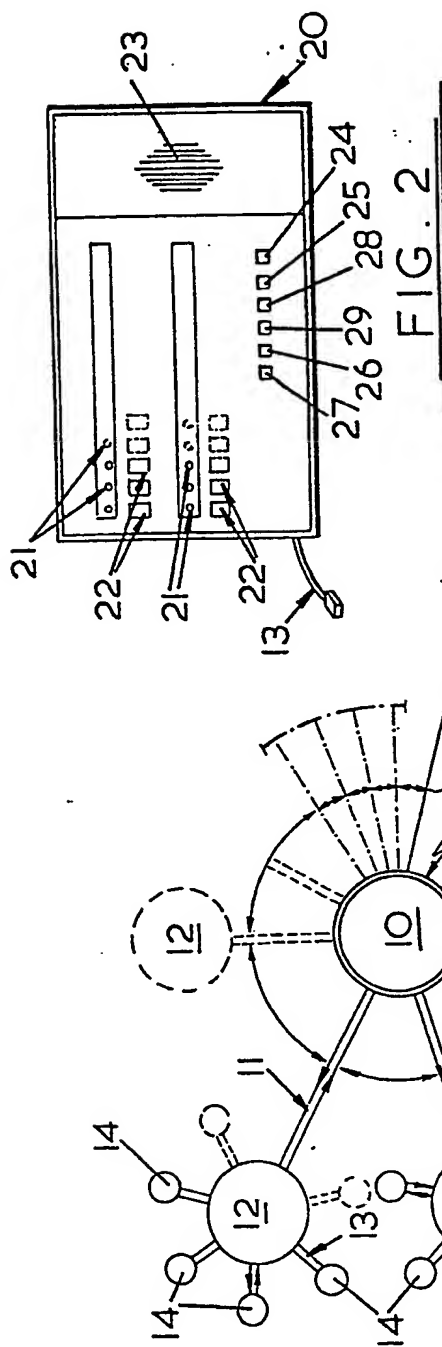
#### Patentanspruch

Kommunikationssystem mit einem Endgerät (20), das über ein Kommunikations-Leitungsnetz (13) mit einer Vielzahl von Außenstationen (30) verbunden ist und über Kommunikationskanäle (11) mit einem entfernt gelegenen Kommunikationszentrum (10), wobei die Kommunikationskanäle MODEMS (40, 40a) und Kodiervorrichtungen (35) enthalten und für Multiplex-Betrieb ausgerüstet sind, dadurch gekennzeichnet, daß das System ein Kommunikationssystem für Sprache und Überwachungssignale für die überwachte Unterbringung ist und eine Vielzahl von überwachten Unterbringungsgruppen (12, 14) enthält, von denen jede eine Vielzahl von bewohnten Häusern

(14) und ein Haus (12) eines lokalen Betreuers aufweist, daß im Haus (12) des lokalen Betreuers ein Endgerät (20) eingerichtet ist und die Außenstationen (30) in jeweils einem der bewohnten Häuser (14) untergebracht sind, daß jede Außenstation (30) und jedes Endgerät (20) eine durch Bedienungspersonen betätigte Lautsprecher/Mikrophon-Einrichtung (31, 32, 33) und eine Überwachungsvorrichtung (27) enthält, so daß in jeder Gruppe die bewohnten Häuser (14) einzeln über eine Zwei-Weg-Kommunikation für Sprache und Überwachungssignale mit dem Haus (12) des Betreuers in Verbindung stehen und das entfernt gelegene Kommunikationszentrum (10) das Endgerät (20) in jedem Betreuerhaus funktionell dupliziert und daß jedes Betreuerhaus (12) Vorrichtungen (29) umfaßt, mit denen das betreffende Leitungsnetz (13) über den betreffenden Kommunikationskanal (11) zum Kommunikationszentrum (10) durchgeschaltet wird, um so das Endgerät (20) des lokalen Betreuers zu umgehen.

#### Revendication

Système de communication comprenant un terminal (20) interconnecté, par un réseau de communication (13), à une pluralité de postes extérieurs (30) et, par des canaux de communication (11) comportant des modulateurs-démodulateurs (40, 40a) et des moyens de codage (35) et prévus pour fonctionner en mode multiplex, avec un centre de communication à distance (10), caractérisé en ce que le système est un système de communication pour logements surveillés, pour conversation et signaux de surveillance d'habitation, et comprend une pluralité de groupes de logements surveillés (12, 14) dont chacun comporte une pluralité de logements de résidents (14) et un logement de gardien local (12), ce logement de gardien local (12) contenant un dit terminal (20) et les dits postes extérieurs (30) étant placés dans des logements respectifs des logements de résidents (14), chaque poste extérieur (30) et chaque terminal (20) comprenant un dispositif haut-parleur/microphone (31, 32, 33) actionné par opérateur et un dispositif de surveillance d'habitation (27) de sorte que pour chaque groupe les logements de résidents (14) sont individuellement en communication bidirectionnelle de conversation et de signal de surveillance d'habitation avec le logement de gardien (12) et le dit centre de communication à distance (10) reproduit fonctionnellement les fonctions du terminal (20) à chaque logement de gardien (12), chaque logement de gardien (12) comportant des moyens (29) pour commuter le réseau correspondant (13) sur le centre de communication (10) par l'intermédiaire du canal de communication correspondant (11), de façon à court-circuiter le terminal (20) de gardien local.



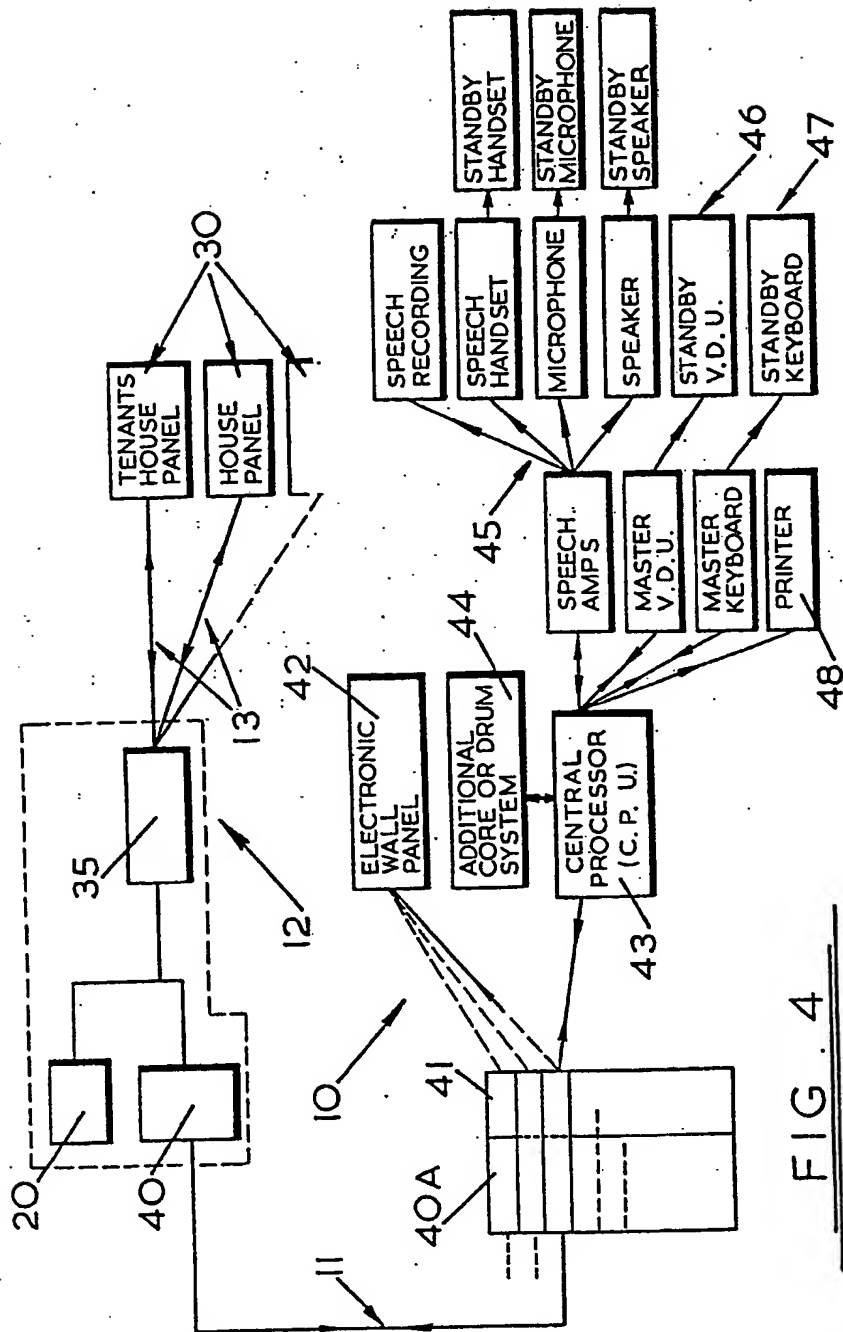


FIG. 4

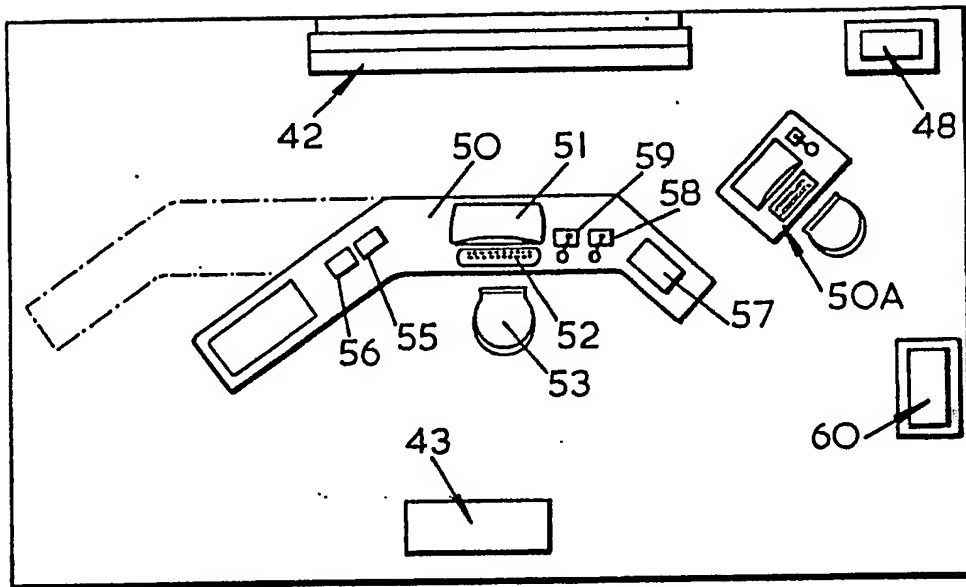


FIG. 5